



GENERAL ELECTRODYNAMICS CORPORATION

4430 FOREST LANE • GARLAND, TEXAS 75041 • BR 6-1161 • CABLE: GECGARLAND

December 11, 1964

Mr. T. Nelson
Systems Consultant
Box 1546
Poughkeepsie, New York 12603

Dear Mr. Nelson:

Thank you for your recent inquiry about our 8484 vidicon. Here are the specifications on the 8484, and also a copy of our Quick Reference Catalog.

The 8484 has two main advantages:

- new low dark current photoconductor, giving higher effective sensitivity
- 1000-lines/inch mesh, giving
 - a) better shading
 - b) flatter field
 - c) higher center resolution
 - d) far higher corner resolution.

and yet its price is the same as the older types it supersedes, 7325 & 7735A.

Would you care to have your name added to our mailing list? If so, please return the "Reply Paid" post card attached.

Very truly yours,

GENERAL ELECTRODYNAMICS CORPORATION

Mike Chater

Michael L. Chater
Sales Manager
Electronic Tube Division

MLC: on

Enclosures: 8484 Spec, QRC & postcard.



**GENERAL
ELECTRODYNAMICS
CORPORATION**

Vidicons and Special Purpose Tubes



Electronic Equipment and Systems



Optical Components and Systems



Mechanical Products



4430 FOREST LANE • GARLAND, TEXAS
(214) BRoadway 6-1161

INTRODUCTION

General Electrodynamics Corporation was organized in 1955 to develop and manufacture television pick-up and other special purpose tubes. Presently, two completely air-conditioned buildings, designed and built to meet particular environmental requirements, are used for engineering and manufacturing of special purpose tubes, electronic equipment and optics. Ultra-clean assembly rooms, precision machine shop, automatic vacuum equipment and a 165 foot long infrared tunnel are a few features of this facility located in Garland, Texas.

To capture a recognized position of leadership in an existing field required foresight, planning and aggressiveness, supported by skilled, technically capable personnel. It required new approaches to tube construction, development and evaluation of photoconductive materials, quality control and manufacturing techniques. A vidicon with an improved photoconductor and gun construction was the first product introduced. Today GEC produces the most sensitive and precisely manufactured vidicon available and the largest variety of vidicons developed to meet a wide range of specific requirements. As a result of these and other developments, General Electrodynamics Corporation became a major supplier of vidicons and special purpose tubes for the electronics industry in a relatively short time.

By designing and building the specialized test and production equipment needed to manufacture special purpose tubes, GEC created a capability beyond electronic tubes. The result was the formation of the Electronic Equipment Division, now supplying specialized video equipment and test equipment to the electronic and space industry, as well as to the GEC Tube Division.

To supply high-quality specialized optical components in quantity to meet the stringent requirements demanded by precision imaging tubes and electro-optical equipment, an optics division was formed. Today the Astron Optics Division's unique capability is available to design, develop and manufacture precision optics covering the spectrum from vacuum ultraviolet to the far infrared.

Today GEC is continuing its active growth by providing a wide and ever increasing variety of electronic tubes, electronic equipment and optics for industrial, space and military use. GEC is proud of its people, whose individual capabilities have made this growth possible.

ELECTRONIC TUBE DIVISION

ELECTRONIC TUBE DIVISION produces the most sensitive and precisely manufactured vidicon available and the largest variety of vidicons developed to meet a wide range of specific requirements. New approaches to tube construction, development and evaluation of photoconductive materials, quality control and manufacturing techniques has enabled General Electrodynamics Corporation to become a major supplier of vidicons and special purpose tubes.



TD 8484



TD 8507



TD 1337

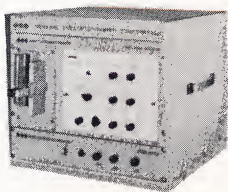


TD 1372



TD 7522

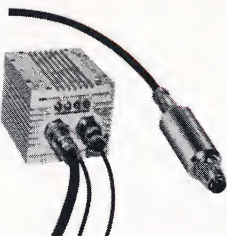
ELECTRONICS DIVISION



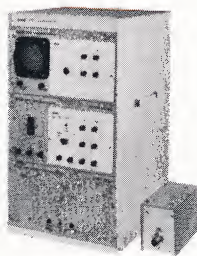
ED 6025



ED 6021



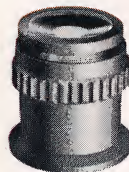
ED 6038



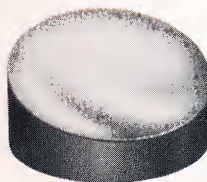
ED 6030

ELECTRONICS DIVISION experience is in the design of precision transistorized video systems and electronic equipment. This unique technical knowledge and overall experience led to contracts from the Government and other organizations having requirements for special imaging systems. These developments led to its present product line which enabled this division to become one of the major suppliers of specialized video systems including: scan converters, slow scan TV systems, and variable scan systems including: scan video signal generators.

ASTRON OPTICS DIVISION



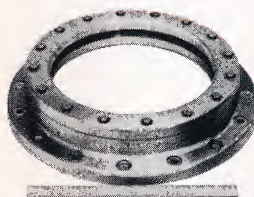
CATADIOPTRIC
LENS



MIRRORS
FILTERS



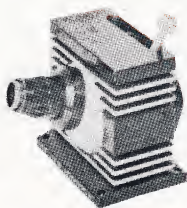
PRISMS



OPTICAL FLATS

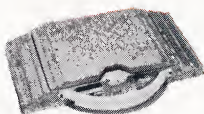
ASTRON OPTICS DIVISION's unique capability is available to design, develop and manufacture precision optics covering the spectrum from vacuum ultraviolet to the far infra-red. This division supplies high quality specialized optical components to meet the stringent requirements demanded by precision imaging tubes and electro-optical equipment. It also has equipment capable of handling optical flats up to 24" diameter.

MECHANICAL DIVISION

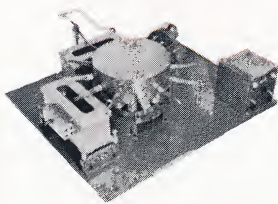


CAMERA MOUNT

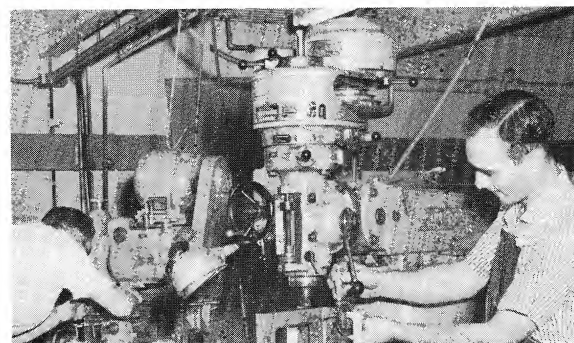
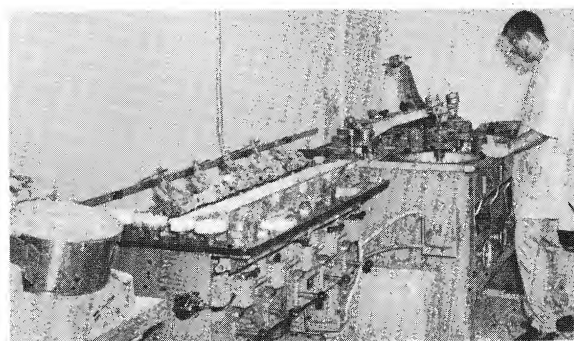
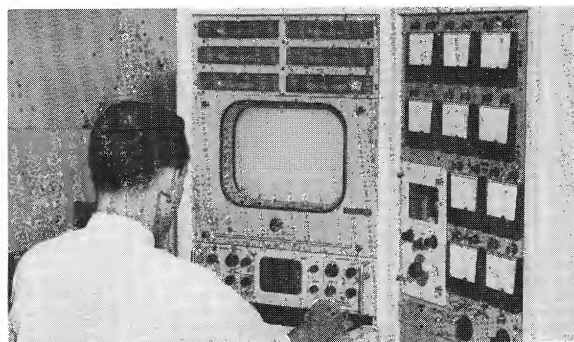
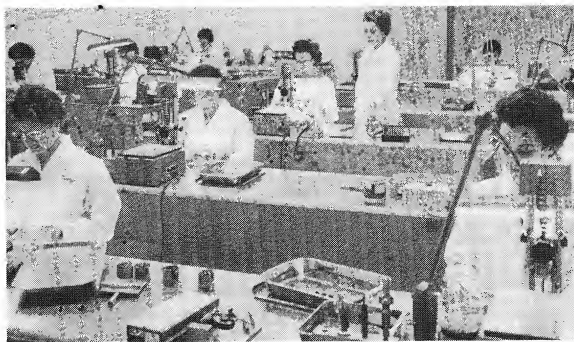
MECHANICAL DIVISION manufactures precision machined products of very high quality in a completely equipped and staffed area of the GEC complex. These high quality products range through a wide area including such items as camera mounts, portable vehicle scales, complex automated devices and mechanical components. The wide diversification of this division also lends itself to the designing and fabrication of mechanical parts and assemblies for other GEC divisions.



PORTABLE SCALE



AUTOMATED MACHINE



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Please add my name to your mailing list!

I am particularly interested in:

ELECTRONIC TUBES

- ☐ Vidicon Tubes
- ☐ Scan Converters

ELECTRONIC EQUIPMENT

- ☐ Scan Conversion
- ☐ Instrumentation TV Cameras
- ☐ Slow Scan Monitors
- ☐ Slide Video Generators
- ☐ Camera Tube Test Sets

SPECIAL OPTICS

- ☐ _____

MECHANICAL EQUIPMENT

- ☐ Portable Truck Scales
- ☐ Printed Circuit Boards

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GENERAL ELECTRODYNAMICS CORPORATION

GEC SPECIAL VIDICON TYPES

September, 1964

TYPE	Diameter - ins.	Length - ins.	Focus; Deflection	Heater - ma.	Separate Mesh	Ruggedization available	FEATURES
TD 1302 -	1/2	3-1/4	MM	170	Yes	R;SR	Miniature
TD 1305 -	1/2	3-1/4	EM	170	Yes	R;SR	Miniature
TD 1325 -	1	5-1/8 to 6-1/4	MM	600	-	-	8484 construction
TD 1337 -	1	6-1/8	EM	300	Yes	-	Hybrid
TD 1339 -	1	5-5/8 to 6-1/8	EM	150	Yes	R;SR	Hybrid; low power heater
TD 1340 -	1	6-1/4	MM	600	Yes	-	8507 construction
TD 1341 -	1	6-1/4	MM	300	Yes	-	8485 construction
TD 1343 -	1	5-1/2 to 6-1/8	EE	150	Yes	R;SR	Fully Electrostatic; low power heater
TD 1347 -	1	5-1/2 to 6-1/8	EE	300	Yes	R;SR	Fully Electrostatic
TD 1348 -	1	5-1/8 to 6-1/4	MM	300	Yes	R;SR	High resolution; separate mesh
TD 1354 -	1	5-1/8 to 6-1/4	MM	300	-	R;SR	8484 construction
TD 1355 -	1	5-1/8 to 6-1/4	MM	150	Yes	R;SR	Separate mesh; low power heater
TD 1368 -	1	5-1/8 to 6-1/4	MM	150	-	R;SR	7226 construction

M - Magnetic

E - Electrostatic

R - Ruggedized

SR - Super-ruggedized

The above type numbers are usually followed by a three-digit dash number which defines a customer's specific requirements: These may include:

SLOW SCAN SURFACE. Many variations are available, the particular design used depends on: *shutter speed, holding period before scan, scan rate, number of scanning lines, frame rate, resolution, gamma, dynamic range, spectral response, sensitivity and erasure requirements.*

SPECIAL FACEPLATE MATERIALS can be ground in our own **ASTRON OPTICS DIVISION**. **RETICLES AND BLACK REFERENCE MARKS** are available to your print.

ENVIRONMENTAL CAPABILITIES of General Electrodynamics vidicons are described in another brochure.

Discuss these and your other specific vidicon requirements with:

Sales Manager

ELECTRONIC TUBE DIVISION

GENERAL ELECTRODYNAMICS CORPORATION, GARLAND, TEXAS

P. O. BOX 798

214-276-1161

GENERAL ELECTRODYNAMICS CORPORATION

EIA REGISTERED AND GEC STANDARD VIDICON TYPES

September, 1964

TYPE	Diameter - ins.	Length - ins.	Focus; Deflection	Heater - ma.	Separate Mesh	Ruggedization	FEATURES: APPLICATIONS
6326A	1	6-1/4	MM	600	-	-	TV Film Pickup; Kovar Seal; dyn. focus
7038	1	6-1/4	MM	600	-	-	Live scenes and TV Film Pickup
7226	1	5-1/8	MM	150	-	-	Short length; low power heater
7226A	1	5-1/8	MM	150	-	R	Ruggedized 7226
7291	1	6-1/4	MM	600	-	-	TV Film Pickup; Kovar Seal
7325	1	6-1/4	MM	600	-	-	Superseded by 8484
7336	1	6-1/4	MM	600	-	-	Broadcast Live PU; Prov. for dyn. focus
7522	1	6-1/8	EE	300	Yes	-	Electrostatic with Deflectron
7697	1	6-1/4	MM	600	-	-	Low Target Voltage for ATC
7735A	1	6-1/4	MM	600	-	-	Superseded by 8484
8355	1	6-1/4	MM	300	-	-	8484 Construction
8484	1	6-1/4	MM	600	-	-	Standard high sens. & high res.
8485	1	6-1/4	MM	300	Yes	-	Hi res.; separate mesh; new gun design
8507	1	6-1/4	MM	600	Yes	-	High resolution; separate mesh
TD 1320	1	6-1/4	MM	600	-	-	Plotting boards; stationary scenes
TD 1326	1	6-1/4	MM	600	-	-	Radar display; short term storage
TD 1337	1	6-1/8	EM	300	Yes	-	Hybrid; Compact camera
TD 1355	1	6-1/4	MM	150	Yes	-	Separate mesh; Low power heater

M - Magnetic

E - Electrostatic

R - Ruggedized

ELECTRONIC TUBE DIVISION

GENERAL ELECTRODYNAMICS CORPORATION, GARLAND, TEXAS

P. O. BOX 798

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GENERAL ELECTRODYNAMICS CORPORATION

TD 8484 VIDICON

MAGNETIC FOCUS AND DEFLECTION

The TD 8484 Vidicon has been specially designed for televising live scenes giving pictures of satisfactory quality with as little as 0.2 foot-candles of illumination on the faceplate. The improved photoconductive coating features high sensitivity, resistance to burn-in, and excellent uniformity, so that optimum pictures may be obtained by adjustment of the signal electrode voltage without limiting re-

strictions on the dark current. 1000-line/inch mesh provides improved uniformity of focus over the scanned area and maintains high resolution and sensitivity at the corners as well as in the center of the faceplate. Patented internal construction allows the tube to be operated in any position and in high ambient noise environments. The TD 8484 supersedes tube types 7325 and 7735A.

DATA

GENERAL:

Operating Position	Any
Focusing Method	Magnetic
Deflection Method	Magnetic
Max. Useful Diagonal of Rectangular Image (4 x 3 Aspect Ratio)	0.625 in.
Orientation of Image....Horizontal Scan should be essentially parallel to a plane passing through tube axis and the short index pin.	

ELECTRICAL CHARACTERISTICS:

Heater	
Voltage (AC or DC)	6.3 V $\pm 10\%$
Current	.60 A $\pm 10\%$
Direct Interelectrode Capacity (Signal Electrode to all other Electrodes)	3.1 pf
Spectral Response (See Fig. 4)	S-18

ABSOLUTE MAXIMUM RATINGS:

Heater - Cathode Peak Values	
Heater Negative with Respect to Cathode	125 V
Heater Positive with Respect to Cathode	10 V
Grid No. 1 Voltage	
Negative Bias Values	300 V
Positive Bias Values	0 V
Grid No. 2 Voltage	1000 V



ELECTRONIC TUBE DIVISION

GENERAL ELECTRODYNAMICS CORPORATION, GARLAND, TEXAS

ABSOLUTE MAXIMUM RATINGS (Continued):

Grid No. 3 Voltage	1000 V
Faceplate	
Illumination	1000 ft-c
Operating Temperature	71° C
Storage Temperature	125° C
Signal Electrode Current	.60 uA

TYPICAL OPERATION:

Minimum Peak-to-Peak Blanking Voltage	
When applied to Grid No. 1	30 V
When applied to Cathode	10 V
Grid No. 1 Voltage (For picture cut off with no blanking voltage on Grid No. 1)	-45 to -100 V
Grid No. 2 Voltage	300 V
Grid No. 3 Voltage	200 to 300 V
Signal Electrode Voltage	
For 5 ft-c faceplate illumination and signal output current of .2 uA	20 to 50 V
For .2 ft-c faceplate illumination and signal output current of .14 uA	40 to 100 V
*Optimum Signal Output Current (See Figure 6)	
For uniform 2870° K Tungsten Illumination on faceplate down to .5 ft-c	.2 uA
For uniform 2870° K Tungsten Illumination on faceplate from .2 ft-c to .5 ft-c	.14 to .2 uA
Average Gamma of Transfer Characteristic over Signal Output	
Current operating range of .05 to .2 uA	.65
**Scanned Area	0.500 x 0.375"
Faceplate Temperature	30° to 35° C.
Magnetic Field Intensity at Center of Focusing Device	40 gauss
Magnetic Field Intensity of Adjustable Alignment Coil	0 to 4 gauss

*Signal output current equals signal electrode current minus dark current.

**A scanned area of 0.500 x 0.375" was used to obtain all data and characteristic curves.

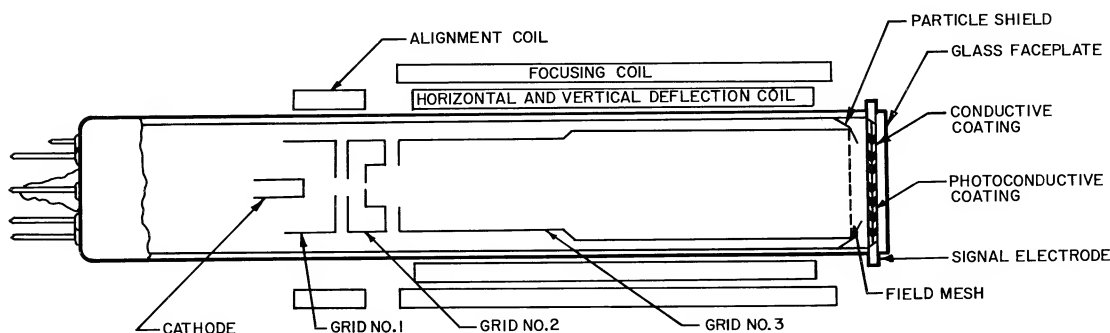


FIG. 1

PRINCIPLES OF OPERATION

The TD 8484 is intended primarily for use in closed circuit television applications. The high sensitivity of the tube results in high quality pictures under normal room and industrial area lighting conditions..

The operation of the TD 8484 Vidicon is based on the principle of photoconductivity which produces a change in electrical conductivity with variations in incident light intensity.

The inside surface of the vidicon faceplate is coated with a transparent conductive coating as shown in Figure 1. Over this is deposited a layer of photoconductive material. This material, when dark, is a reasonably good insulator. The electron beam is made to scan the back surface of this photoconductive surface.

In operation, the front surface of the photoconductor is held at a potential of approximately 30V, positive with respect to the cathode, by the application of this voltage to the transparent conductive coating. The scanning electron beam deposits a negative charge on the back surface of the photoconductor. Where the photoconductor is dark, and its resistance therefore high, the negative charge accumulates until this back surface is at the same potential as the cathode; any further electrons will be turned away. The dark portions of the photoconductor thus become charged in the manner of a capacitor. Dark current is slight electrical leakage through the dark areas.

But where light falls on the photoconductor, from the image of the scene, the conductivity of the material is substantially increased. The resulting leakage of the charge leaves a "hole" in the pattern of negative charge at any illuminated point. Upon its next trip across this point, then, the scanning beam will deposit electrons into this "hole"; this movement of charge calls

for a corresponding flow of current into the transparent conductive coating, and the resulting voltage across the load resistor is the output video signal.

The vidicon thus has the ability to "store" the image for an entire scanning cycle; the image is "photographed" in the pattern of negative charge on the back surface of the photoconductive material, and is accumulated there for the time of one complete frame. This process allows the improved TD 8484 Vidicon to produce usable output from scenes which are dimly lighted.

The end of Grid No. 3 nearest the faceplate is covered by a very fine mesh screen. The purpose of this screen is to establish a uniform decelerating field in the vicinity of the photoconductive surface, so that the electrons will arrive perpendicular to this surface and with low velocity. The fine mesh screen provides a conducting plane through which electrons can readily pass.

The use of 1000-line/in. mesh in the TD 8484 Vidicon provides improved uniformity of focus, reducing the center to corner focus differential by 75% compared to tubes using 500-line mesh. The finer mesh also raises the limiting resolution and virtually eliminates the possibility of the mesh showing in the picture at any operating potential.

Focusing of the electron beam is accomplished by a magnetic field which is parallel to the axis of the tube. Two magnetic fields which are perpendicular to the axis of the tube and to each other are the means of alignment. Deflection is accomplished by means of magnetic fields perpendicular to the axis of the tube. External coils are necessary to produce these fields.

OPERATING CONSIDERATIONS

DARK CURRENT:

The TD 8484 Vidicon has an extremely uniform dark current over the entire scanned area, which eliminates the problem of edge flare, shading and graininess. Dark current, which is a result of a slight leakage through the dark areas of the photoconductive coating is very consistent from tube to tube. The dark current increases as the signal electrode voltage increases and as the faceplate temperature increases. The faceplate temperature should be held constant or the signal electrode voltage must be adjusted in order to operate at the same signal level. See Figure 7 for lag (which increases with dark current) vs. dark current characteristics.

SIGNAL ELECTRODE CURRENT AND SENSITIVITY:

Sensitivity is a function of the characteristics of the photoconductive coating and the signal electrode voltage. The TD 8484 Vidicon has a high inherent sensitivity due to the unique quality of its photoconductive coating. Due to the exceptional uniformity of the coating, the TD 8484 may be operated at higher levels of dark current with resultant higher sensitivity (see Figure 6 for optimum operating conditions).

Figure 2 also shows the variation of sensitivity with dark current. For example, at one foot-candle and .02 uA dark current, the signal output is .20 uA. Increasing the dark current to .2 uA increases the signal output to .50 uA. Since dark current increases with signal electrode voltage, this curve demonstrates the variation of sensitivity with signal electrode voltage.

TEMPERATURE:

The tube may be stored at temperatures up to 125°C with no damage to the tube. A constant operating temperature of 30° to 35° C is recommended. No damage will result in operating up to 71° C; however, the picture quality will be somewhat reduced. If the tube is to be operated in high light levels, an infrared filter should be used to hold down the faceplate temperature. The signal electrode voltage should be reduced if the tube is being operated at higher temperatures in order to maintain a constant signal electrode current.

TUBE POSITION AND SCAN SIZE:

Orientation and size of scan is important for proper operation of the tube. The scanned area should be one-half inch by three-eighths inch and oriented so that the horizontal scan is parallel to a line through the tube axis and the short index pin. Scanning a smaller area will result in loss of resolution and signal. The resolution varies approximately as the length of scan, and the signal varies in proportion to the area scanned. Permanent changes in sensitivity and dark current occur in the scanned area regardless of raster size. If underscanning has taken place, the sensitivity change will be visible when normal operation is restored. Provision should be made for biasing the tube to cutoff in the absence of scanning in order to prevent damage to the photoconductive coating.

Care should also be taken to assure proper mechanical centering of the tube in the focus, alignment and deflection coils. Highest quality magnetic components must be used to obtain full potential of the TD 8484 Vidicon. The quality of these components is particularly important when operating at higher voltages.

VOLTAGE:

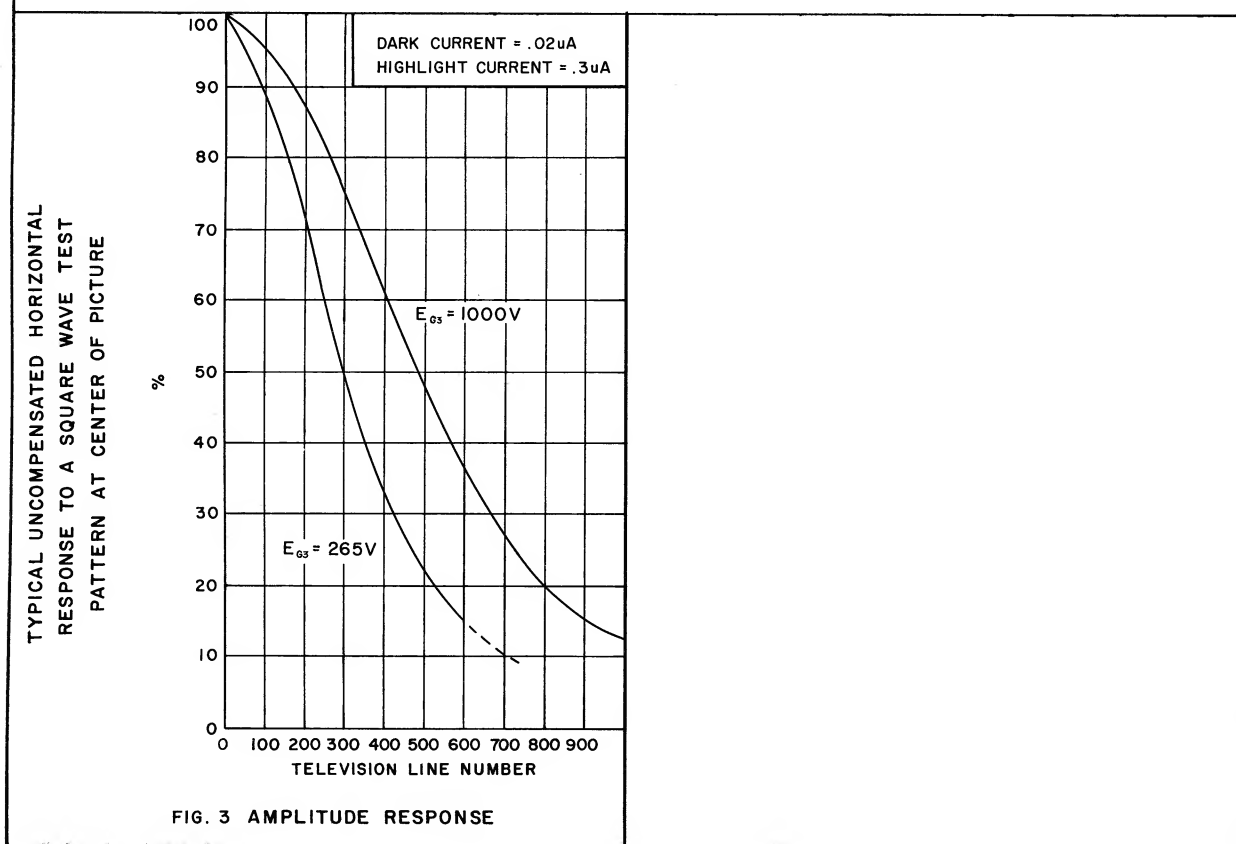
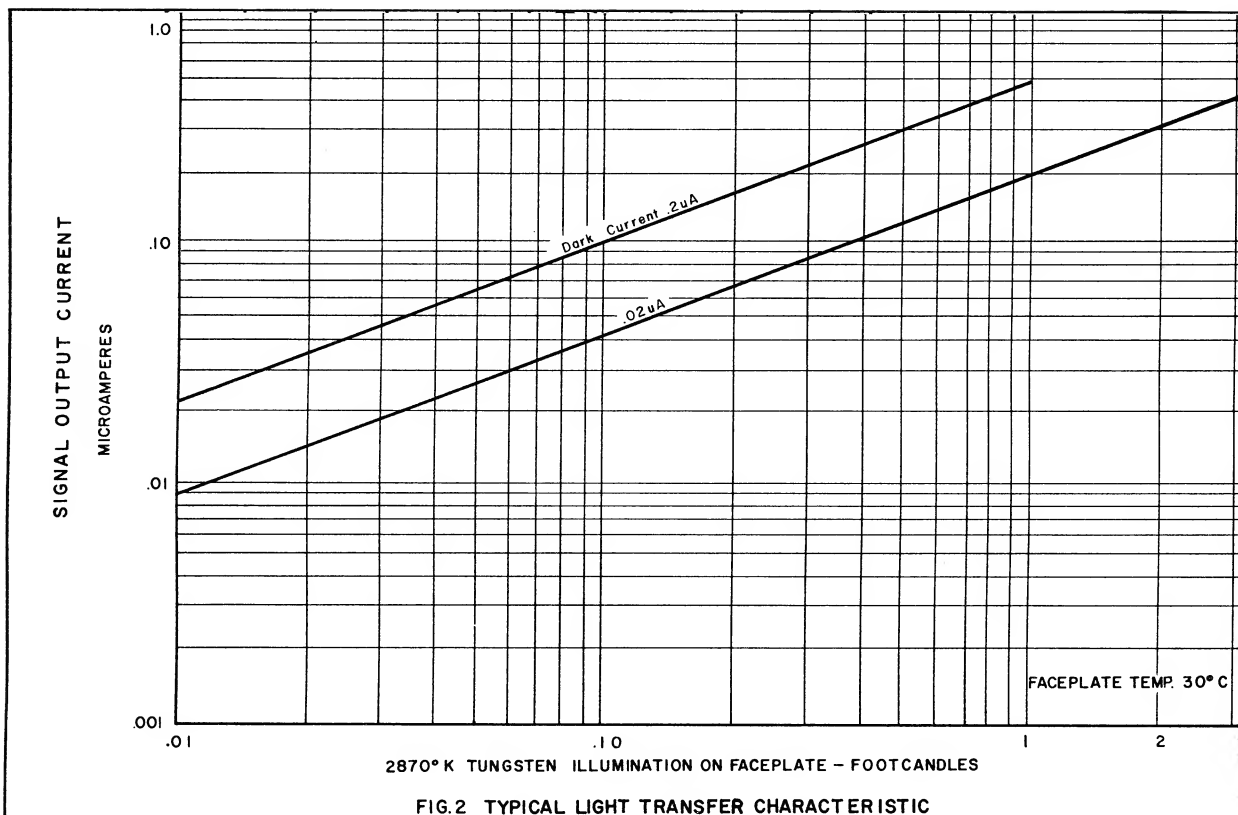
A decrease of effective beam spot size, with a resultant increase in resolution, occurs when operating the tube at a higher G3 voltage level. Conversely, operating at a lower voltage causes a decrease in resolution and picture quality. This characteristic is shown in Figure 3. Grid No. 1 voltage should be maintained just low enough to discharge the highlights of the picture. Excessive beam current will cause a loss of resolution.

PERSISTENCE:

The TD 8484 Vidicon has improved persistence characteristics as a result of its new photoconductive surface. Figure 7 shows these characteristics.

LIGHT TRANSFER CHARACTERISTICS:

Typical signal output current as a function of faceplate illumination is shown in Figure 2. The slope of the curve gives the average gamma of the tube. The tube gamma of .65 is held quite constant from tube to tube making the TD 8484 ideal for use in color cameras where matched tube characteristics are very important.



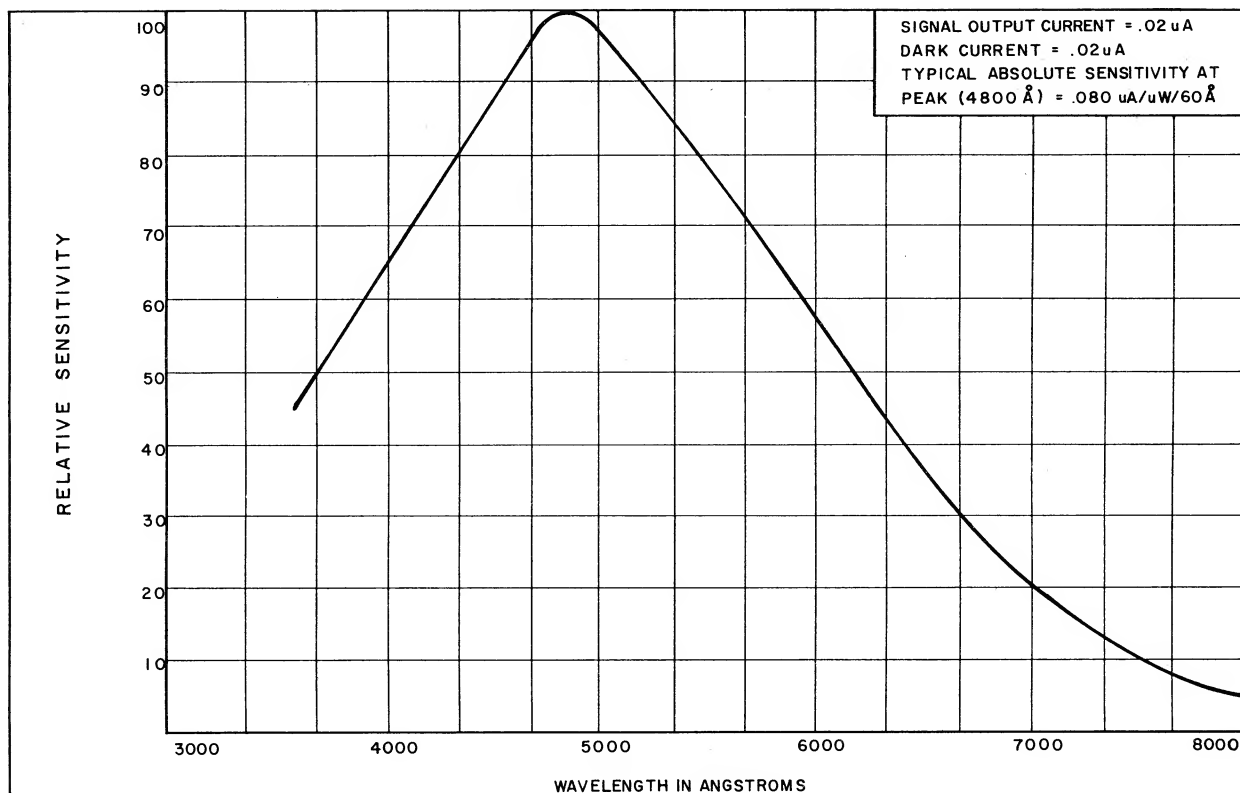


FIG. 4 SPECTRAL RESPONSE

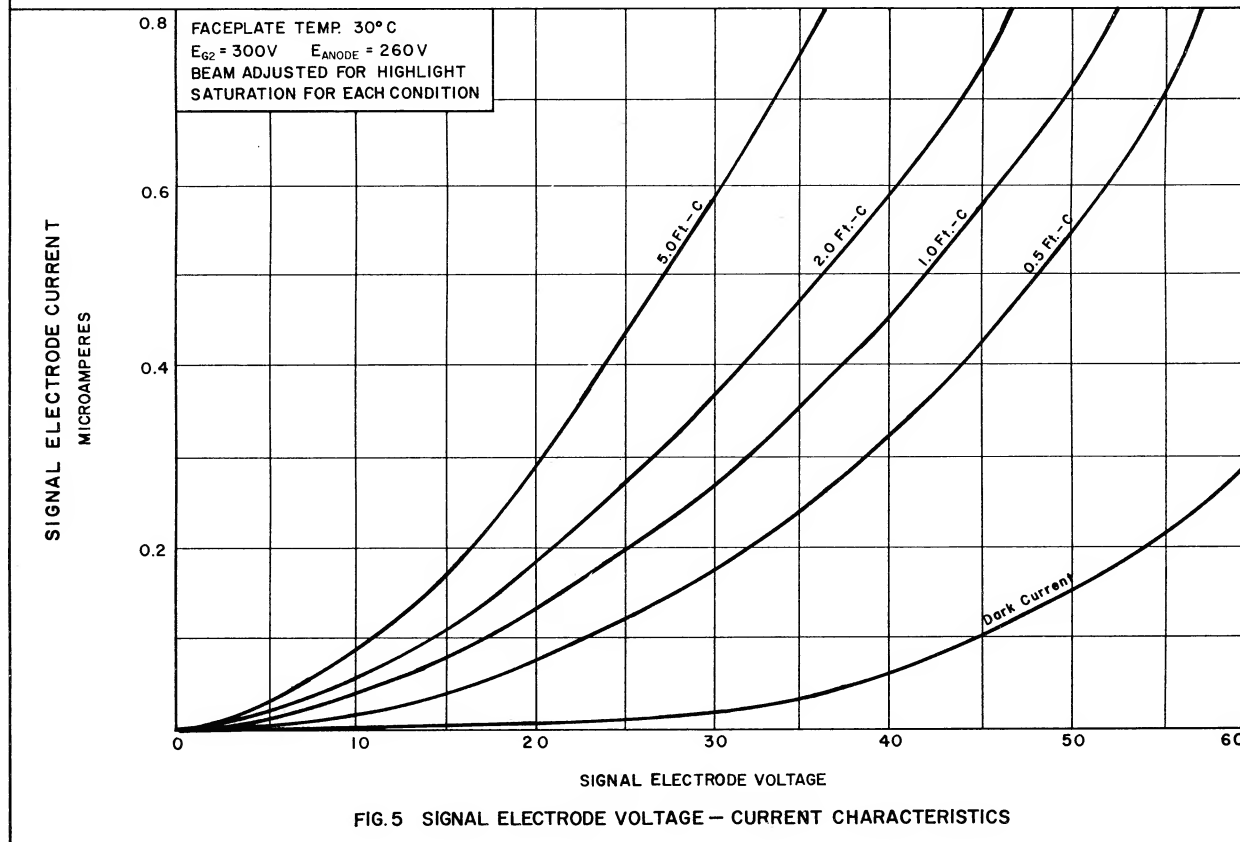


FIG. 5 SIGNAL ELECTRODE VOLTAGE - CURRENT CHARACTERISTICS

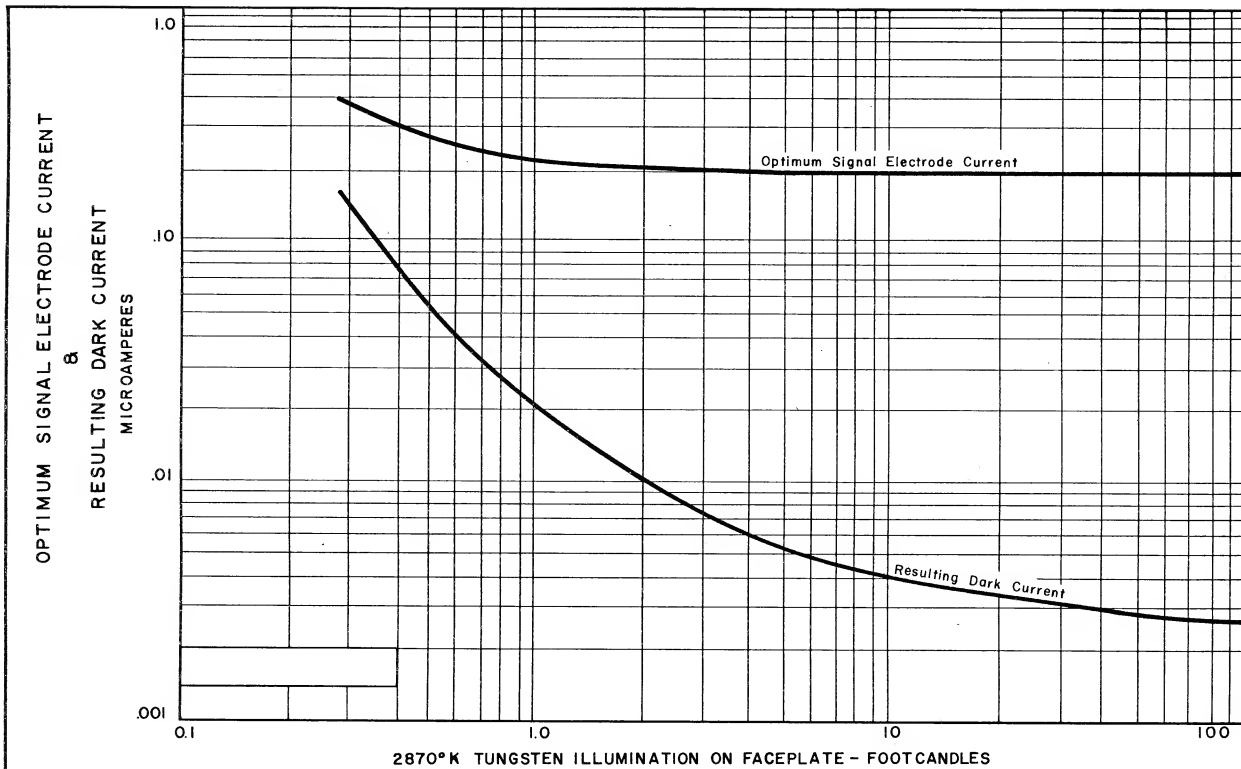


FIG.6 OPTIMUM SIGNAL ELECTRODE CURRENT

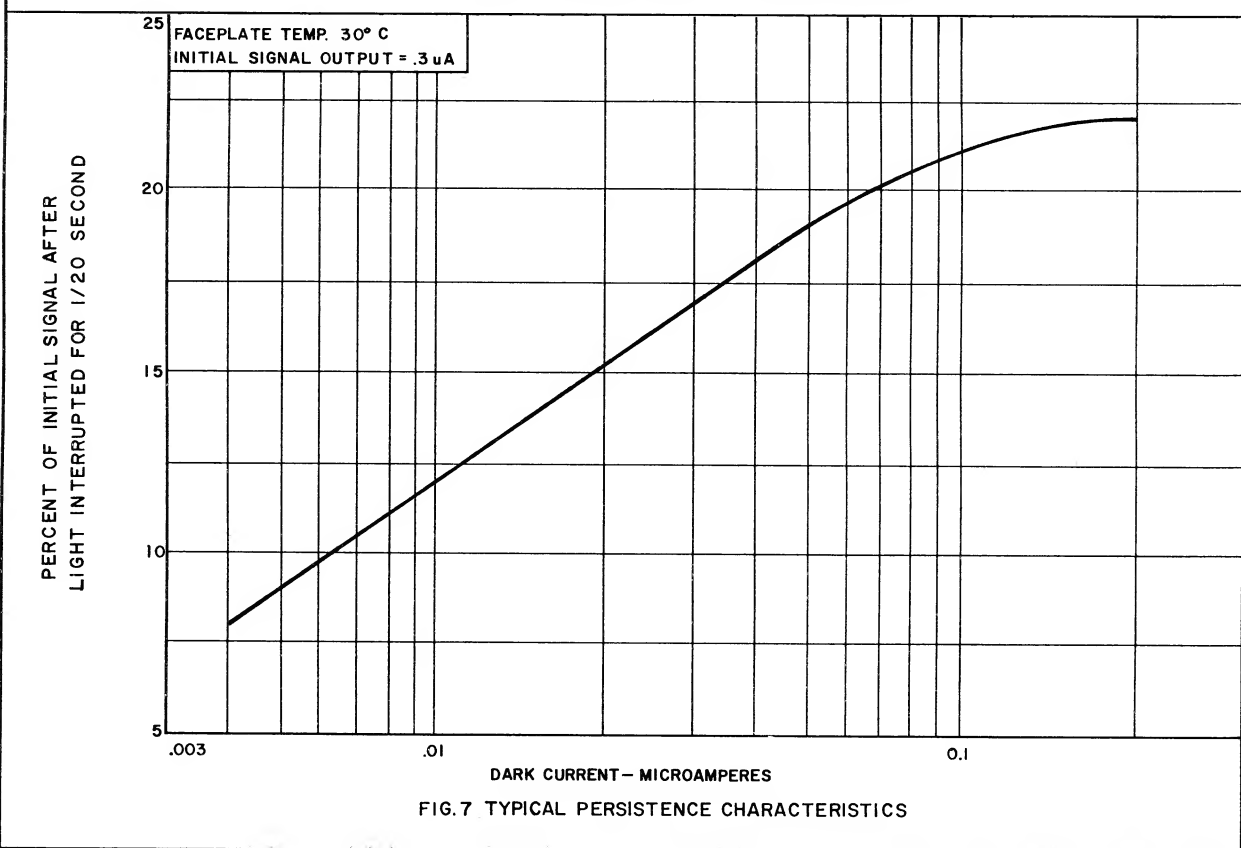


FIG.7 TYPICAL PERSISTENCE CHARACTERISTICS

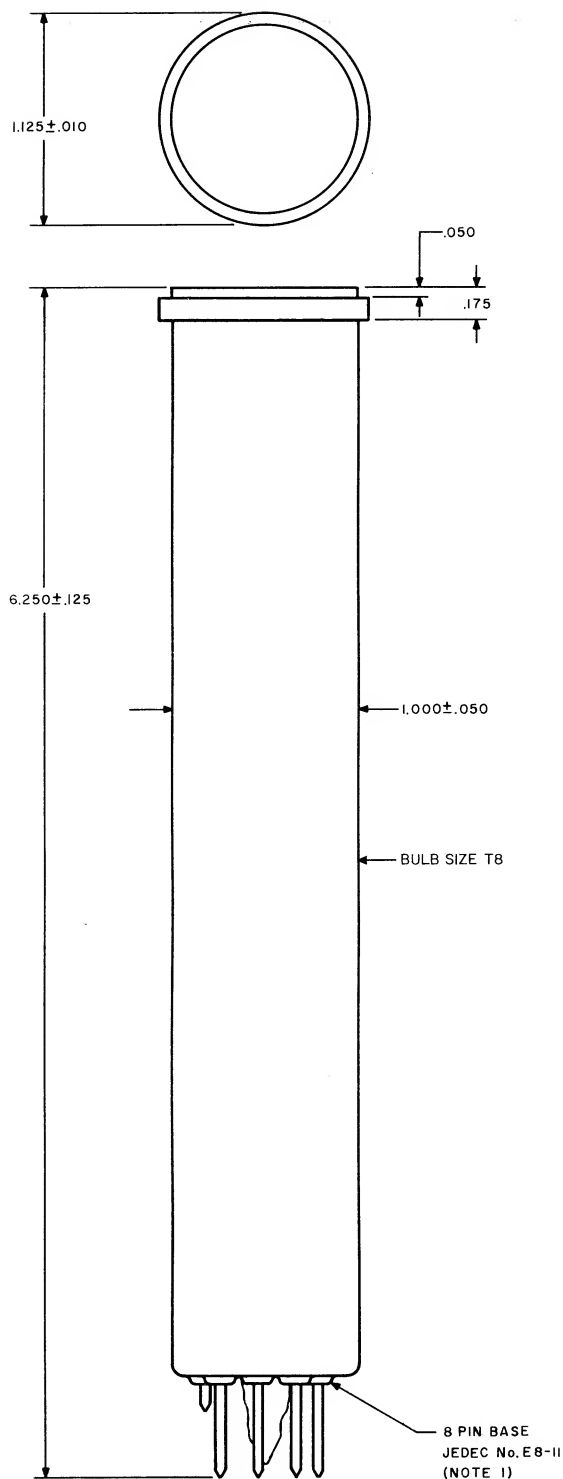


FIG. 8

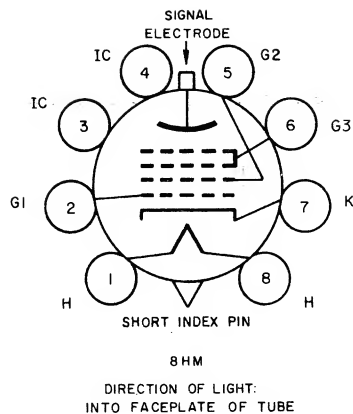


FIG. 9

- PIN 1: HEATER
 PIN 2: GRID No. 1
 PIN 3: INTERNAL CONNECTION--DO NOT USE
 PIN 4: INTERNAL CONNECTION--DO NOT USE
 PIN 5: GRID No. 2
 PIN 6: GRID NO. 3
 PIN 7: CATHODE
 PIN 8: HEATER
 FLANGE: SIGNAL ELECTRODE
 SHORT INDEX PIN: INTERNAL CONNECTION--DO NOT USE

NOTES

1. Base-pin positions fit 0.25 inch thick, 10-hole flat-plate gage with holes located as follows: 9 holes, 0.0550 (± 0.0005) inch diameter equally spaced, 0.2052 (± 0.0005) inch apart on a circle, 0.6000 (± 0.0005) inch diameter, plus a center hole, 0.300 (± 0.001) in. diameter, concentric with 9-hole circle.
2. All dimensions are shown in inches.